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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.08/AR/CSR-09/141g/CEMENT/2016-17 Date: 13.09.2016

TEST REPORT ON CEMENT

*** CUSTOMER**	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
***AGENCY**	:	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
***NAME OF THE WORK**	:	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
***REFERENCE**	:	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	12.09.2016
PERIOD OF TESTING	:	12.09.2016 to 13.09.2016

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	30.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	150 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	480 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

*Information is furnished by the Customer/Representative.

A.E.E.

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VISHWANATH C.
Quality Manager

#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.
Tele Fax : 23223227, Website : www.civiltechconsultants.com
E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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T-2377

Job No.: CTCE/BBMP/W.No.08/AR/CSR-09/141g/SAND-Gradation/2016-17 : 13.09.2016

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. Amruthraj,**
#715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.

*** Name of Work** : Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 12.09.2016

Date of Testing : 13.09.2016

Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	92.00	90-100	90-100	90-100	95-100
2.36	76.80	60-95	75-100	85-100	95-100
1.18	54.90	30-70	55-90	75-100	90-100
600 Micron	25.90	15-34	35-59	60-79	80-100
300 Micron	12.70	5-20	8-30	12-40	15-50
150 Micron	3.70	0-10	0-10	0-10	0-15

* Information is furnished by the Customer/Representative

Remarks : This sample is under Zone-I specific limits.

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Quality Manager

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E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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Job No.: CTCE/BBMP/W.No.08/AR/WMM/Gradation/2016-17 13.09.2016

GRADATION FOR WMM

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. Amruthraj,**
#715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.

Name of Work : Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015

Date of Testing : 13.09.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	95	95	1.9	98.1	95-100
22.4	1560	1655	33.10	66.90	60-80
11.2	1030	2685	53.70	46.30	40-60
4.75	535	3220	64.40	35.60	25-40
2.36	485	3705	74.10	25.90	15-30
0.600	490	4195	83.90	16.10	8-22
0.075	660	4855	97.10	2.90	0-5

AE-B

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4th Block, Shakthiganapathinagara,
Basaveshwaranagar,
Bangalore-560079.

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Job No.: CTCE/BBMP/W.No.08/AR/WMM/AIV/2016-17 13.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of the Work	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	13.09.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	378	380	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines	20.63	20.79	
	100* (W_2/W_1)%			**20.71**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Bangalore-560079.

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Job No.: CTCE/BBMP/W.No.08/AR/WMM/S-T/2016-17 13.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of Work	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	13.09.2016

Result : Flakiness Index = **12.32%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index **25.57%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Bangalore-560079.

#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.

Tele Fax : 23223227, Website : www.civiltechconsultants.com

E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

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Job No.: CTCE/BBMP/W.No.08/AR/SDBC/AIV/2016-17 26.09.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of the Work	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	26.09.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	386	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	300	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$	22.08	22.28	22.18

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.08/AR/SDBC/Shape_T/2016-17 : 26.09.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of Work	: Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 26.09.2016

AE-B

Result : Flakiness Index = **12.35%**

Elongation Index = **13.36%**

Result : Combined Flakiness & Elongation index **25.71%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.08/AR/SDBC/Stripping/2016-17 26.09.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of the work	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	26.09.2016

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.30	96.70
2	3.3		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.08/AR/SDBC/Sp_Wa/2016-17 26.09.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
Name of the Work	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	26.09.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2011	2012	2013	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1256	1257	1258	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2016	2017	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	759	759	759	
6	Weight of oven dried aggregate	W_4 g	2005	2002	2000	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.642	2.638	2.635	2.638
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.677	2.687	2.695	2.687
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.50%	0.70%	0.85%	0.68%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Tele Fax : 23223227, Website : www.civiltechconsultants.com

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Job No.: CTCE/BBMP/W.No.08/AR/SDBC/Bitumen/2016-17 26.09.2016

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP,
AGENCY	**Mr. Amruthraj,** #715, A Block, 2nd Cross, Shankarnagara, Bangalore – 92.
NAME OF THE WORK	Improvements to cross roads and drain in Amco Layout in Ward No.08, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/23/2015-16 Dated: 20.04.2015
SAMPLE I/D	Roads in Amco Layout in Ward No.08
DATE OF TESTING	26.09.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475.5	473.5
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	24.5	26.50
7. Bitumen content in %	4.90	5.30
8. Average	**5.10**	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	35.26	7.42	7.42	92.58	90-100
4.75	260.8	54.85	62.26	37.74	35-51
2.36	35.26	7.42	69.68	30.32	24-39
1.18	43.16	9.08	78.75	21.25	15-30
0.3	43.36	9.12	87.87	12.13	9-19
0.075	31.22	6.57	94.44	5.56	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	31.22	6.24	6.24	93.76	90-100
4.75	262.3	52.46	58.70	41.30	35-51
2.36	60.25	12.05	70.75	29.25	24-39
1.18	52.32	10.46	81.22	18.78	15-30
0.3	41.23	8.25	89.46	10.54	9-19
0.075	30.22	6.04	95.51	4.49	3-8

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E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com